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ABSTRACT

This new model for the supervision of student teachers utilizes videotaping hardware which allows the student teacher and his supervisor to evaluate teaching methods and behavior. Thus, the student teacher is better able to supervise himself. Employing Flanders Interaction Analysis, the student is able to interpret his teaching on closed-circuit T.V. This enables him to measure the predominant qualities of contact between teacher and pupils. Results of preliminary testing indicate that student observations on the same videotaped lesson agree with each other to a moderate degree. The latter can be explained by the relatively short teacher training time. (Six appendixes detailing data are included.) (JB)

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The MICROTEACHING Project

Christer Brusling – Jan-Gunnar Tingsell

SELF-OBSERVATION AND SELF-ANALYSIS IN TEACHER TRAINING

Teaching materials and curriculum together with preliminary findings on their use

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April, 1973

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SUMMARY of research report

SELF-OBSERVATION AND SELF-ANALYSIS IN TEACHER TRAINING

Teaching materials and curriculum together with preliminary findings on their use.

This paper is an argument for a new model for the supervision of student teachers during their practice teaching and an argument against the traditional type of supervision. The latter is said to work with a language which does not have the same meaning for both student teachers and their supervisors. It is moreover claimed that traditional supervision mainly has the function of assessment, which is unmotivated in view of the little knowledge there is about the characteristics of effective teachers.

The new supervision model makes use of instruments for systematic observation. By this means the language used in speaking about teaching gains increased precision - a precision which allows a sophisticated analysis of teaching and which leads to assessment being replaced by problem-solving.

The video-taping of teaching practice, together with instruments for systematic observation, can make it possible for the student teacher to supervise himself. The paper presents newly constructed teaching materials, to a great extent based on closed-circuit television, which after four hours of study lead to an ability to observe and interpret one's own or someone else's teaching on the basis of Flanders' verbal interaction analysis (FIA). Experience shows that the observations made by student teachers on the same video-taped lesson agree with each other to a moderate degree. This is however thought to be satisfactory in view of the short training time. The technique of being able to examine oneself via closed-circuit television with the help of Flanders' interaction analysis was greatly appreciated.

1. BACKGROUND

1.1 Practice teaching with traditional supervision.

Practice teaching is often considered to be the central part of any teacher training programme. It is to this that the contents of the rest of the training programme, methodology and pedagogy, will finally be transferred. It is in practice teaching that the student teacher will experience the practical relevance of methodology and pedagogy. But not in such a way that he feels that he is perfect or believes that he has an exhaustive list of the teaching patterns applicable to his subject, but so that "interest is aroused for the continuous renewal, development and improvement of his teaching". (Training programme for special subject teachers at Schools of Education, 1971 and Training programme for class teachers at Schools of Education, 1971).

In educational publications in recent years more and more dissatisfaction has been expressed with how the traditional supervision model fulfils the aims of practice teaching. Medley (1971) explains this by saying that the supervisor has not succeeded in the vital task of conveying correct and intelligible information to the student teacher about his teaching. Michalak, Soar and Jester (1969) state that teacher effectiveness has long been considered more from a folklore than a scientific angle ".....ideas and methods appearing to have been successful with one generation of teachers were simply passed on to another."

They also present a comparison between two different types of supervision models, the traditional one and a new one that is gaining ground (see Fig. 1). From this can be seen that the traditional role of the supervisor is that of judge and marker, and that his traditional function is that of assessment. That this function cannot be carried out without the student teacher, the one who is to be given guidance, being put into a defensive position that is unproductive for his development can be witnessed daily.

1.2 Instruments for systematic observation.

An instrument for systematic observation uses terms with behavioral definitions and this makes it possible to describe teaching both unambiguously and communicatively. This description is concrete and

Figure 1. Two styles of supervisory conference.

Elements	Former Supervision Model	Emerging Supervision Model
Purpose	To point out the right from wrong way of teaching	To create a change in behavior and cognitive understanding of one's teaching
Process	Evaluating	Problem solving
Role	Evaluator	Facilitator
Supervising Instrument	Rating Scale (if any)	Systematic observation
Stated Objectives	General in nature	Specific and stated in behavioral terms
Universe of Discourse	Descriptive terms, meant different things to different people	Technical terms, behaviorally stated language used by researchers, supervisors and teachers, all having same meaning

(From Michalak, Soar & Jester, 1969).

precise, thus allowing a more than usually sophisticated analysis. The chances of finding actual changes in behavior from one situation to another are increased. At the same time as there is a gain in concretion, there is, however, a loss in breadth and comprehensiveness. One should therefore work with several instruments which complement each other (Brown 1969).

Instruments for systematic observation are often anchored in a special teaching theory which on the one hand expresses the relationship between the patterns of behavior defined in the instrument, and on the other the relationship between these patterns and measurements of learning and attitudes. The latter type of relationship has not yet been charted so comprehensively and convincingly that some main criteria characteristic of the effective teacher can be agreed upon (see for example a survey by Rosenshine 1971). It is therefore necessary that teacher training moves away from assessment activities and moves towards problem-solving activities. This presupposes work criteria that can be unambiguously communicated and which all those involved are aware of and can understand. (Cf. Musella, 1970, and Medley's, 1971, demands that teacher training should be in terms of a common language when speaking about teaching).

We agree with the opinion which concludes the comparison between the two supervision models referred to in figure 1 : "With the introduction of systematic observation instruments, the conventional methods of supervision, such as taking notes with general remarks and using rating scales when observing teachers, will no longer suffice."

1.3 Self-observation and self-analysis.

Parallel with a pronounced need for instruments for systematic observation can be traced a growing confidence in the ability of the student teacher to analyse himself and to bring about changes determined by himself. Instead of considering the student teacher to be inexperienced and in need of detailed supervision, the student teacher is described as "his own best resource, prepared almost to the point of saturation by recent college course work and a long-time inner preparation for his initial teaching experience." (Lundy & Hale, 1967).

A similar estimation is implied in Brown's (1969) recommendation not to use instruments for systematic observation on the teacher but to let them be used by the teacher or by the student teacher and his supervisor together. That the student teacher makes good use of confidence in his own analytical ability has been shown by Traill (1971). The subjects in Traill's experiment were observed with the aid of Flanders' instrument for verbal interaction analysis. Thereafter they were given a description, without comments, of their teaching for their own analysis and to decide on attempts at changes. This procedure resulted, as time went by, in a higher degree of responsive behavior (see p. 6 for definition)and in greater student participation in the teaching.

The "Minicourses" described by Borg et al (1970) are proof of the fact that teachers can change their behavior in the direction of given targets by means of self-observation with the use of closed-circuit TV.

Breen and Diehl (1970) demonstrated that formalised self-analysis in conjunction with teaching recorded on closed-circuit TV gave just as good results as closed-circuit TV with structured comments from a supervisor. An investigation by Bedics and Webb (1971) showed that student teachers who after practice in different techniques of teaching analysis observed their own video-taped teaching directed their analysis faster than others towards their teaching behavior, as distinct from their personal behavior, manner, etc. This and similar investigations further showed that repeated opportunities for self-observation are required before one is capable of making maximum use of the technique.

A teacher training program which provides the student teacher with a language for teaching analysis, instruments for systematic observation, and opportunities for self-observation and self-analysis can result in teachers who will continue to examine themselves critically and who are capable of creating changes determined by themselves.

1.4 Choice of instruments for systematic observation.

The following are reasonable requirements to demand of an instrument for systematic teaching observation in teacher training:

- the ability of the instrument to differentiate more effective teaching from less effective should at least to some extent have been documented by research

- easy to learn
- easy to use
- easy to interpret
- reliable
- research should have shown that teachers who have learnt the instrument and its rationale, and used it, have also changed their teaching
- easy to develop and adapt to different purposes.

It is very likely that no instrument for systematic observation has been so widely used as Flanders' interaction analysis (hereafter called FIA, see Appendix A). Its origin lies in the theory of social psychology and one of its central concepts is socio-emotional climate. By this is meant the general attitudes that a class have in common towards their teacher. These attitudes are determined by the social interplay in the class. The word climate thus refers to the predominant qualities of the contact between teacher and pupils and also between pupils in the absence or presence of the teacher. These predominant qualities are often described by two terms which are the opposite of each other, dominating - integrating (Anderson et al., 1946), authoritarian - democratic (Lippit & White, 1943), teacher-centred - pupil-centred (Withall, 1949), direct - indirect (Flanders, 1960), and initiating - responsive (Flanders, 1970).

The first half of the above word-pairs stands for teacher behavior, such as lecturing, giving directives, criticising pupils, defending teacher authority. The other half stands for teacher behavior such as accepting, elucidating or giving support to a pupil's ideas or feelings, praising and encouraging, asking questions that stimulate pupils to participate in decision-making or that build on what a pupil has said.

By using FIA a description is obtained of the balance between these groups of teacher behavior. There is ample proof for the idea that more responsive teachers are more effective than less responsive (see survey by Flanders, 1970, pp. 389-424). The more responsive teacher has pupils who learn more, are more creative and less dependent than the pupils of the less responsive teacher. This seems to be the case almost independent of subject and grade.

Many teachers experience their teaching as being pupil-centred and their pupils as active despite the fact that investigations have

shown almost the opposite. Bredänge and Odhagen (1972) reach this conclusion after a study of a random sample from the Swedish middle School grades. Flanders (1961) has formulated the so-called "2/3 rule": 2/3 of lesson time someone is talking, 2/3 of this time is used by the teacher, and 2/3 of this time is characterised by initiating talk by the teacher. There is room for improvement here!

Usually more than 14 hours is spent learning the categories of the instrument, its use in observation and problems of interpretation. It has however been shown that it is not always necessary to do more than become familiar with the background of the instrument and its categories to bring about a change in one's teaching behavior (Furst, 1965).

FIA is easy to use. Once the ten categories named 1-10 have been memorised, one only has to write down during observation the figure which best characterises what has just occurred. If this is done as often as is reasonably possible, it has been proved that the tempo will be about 20 markings per minute.

The interpretation of observations collected is facilited by data processing, most suitably done with the help of a computer.

Aspects of reliability have at least two sides. Firstly it is a requirement that two independent observers who observe the same teaching achieve roughly similar results. Scott's coefficient has been suggested as a measure of the degree of agreement (Flanders, 1960). This coefficient assumes a value of 1.00 if the observers make exactly identical markings throughout, and 0.00 if their sequences are not more alike than those which could be attained by chance. Flanders himself gives 0.85 or better as satisfactory.

The other aspect has to do with how representative the resulting descriptions are for a teacher's teaching over a long period. Flanders states that about 6,000 markings made over six to eight lesson visits are desirable if one is to have a stable random sample of the interaction in a class.

Note that what has been said is valid if the aim is to attain a sort of average characteristic over a long period of teaching in different subjects, various phases in the treatment of a learning task, etc. The fact that 6,000 observations are desirable for that aim does not mean that 200 observations (10 min) are worthless

for another, more limited aim.

You only need to glance through the categories in Appendix A to see that there are a number of possibilities for adapting the instrument to your own needs. Flanders (1970) also makes several suggestions for breaking down the main categories into sub-categories suitable for special interests or occasions.

We consider Flanders' interaction analysis as being suitable for introduction into teacher training as a first step away from the traditional supervision model. The next step should be to find instruments which, as well as fulfilling the requirements mentioned above, can supplement FIA so as to make possible a more comprehensive analysis of teaching and so that requirements specific to certain subjects can be met. In this work a bibliography with the title "Classroom Observation Systems in Preparing School Personnel" by Sandebur and Bressler (1970) can be useful. It lists 39 books, articles, reports, and manuals with short descriptions of contents. The anthology "Mirrors for Behavior", compiled by Simon and Boyer (1967 - 1970), contains nearly all the instruments published grouped clearly.

2 CURRICULUM

Here follows a description of the contents of, and the procedures used in, going through the various components in the six-hour curriculum aimed at giving an ability to use Flanders' interaction analysis on one's own video-taped teaching. If one knows it, one can of ourse also make direct observations of others in connection with class-visits, supervision, etc.

2.1 The lesson.

A prerequisite for being able to learn FIA is that one is motivated. A teacher in personal interaction with pupils is considered to provide the best conditions for creating motivation for a learning task (Gagnē, 1965). Thus a 90-minute lesson with a group of 16 was planned and carried through. The main aim of this lesson was to provide motivation for subsequent self-learning activities.

The lesson gave the background to FIA, the teacher presented and the group discussed the instrument (Appendix A) and experimental results demonstrating the connection between the FIA categories and teacher effectiveness. The concepts of initiation and response were introduced. An FIA matrix was analysed with the help of observation data from a lesson inpedagogy the group had had with another teacher a few days earlier. Such an arrangement is very desirable, otherwise the matrix analysis will be too abstract. The lesson analysed had not been attended by the teacher. The student teachers could themselves judge the relevance of the description and were clearly amused by being able to recognise themselves and their pedagogy teacher.

The description of observation technique and the example of matrix analysis also served as a presentation of terminal behavior. The student teachers were asked to memorise the FIA categories for the next meeting.

2.2 The demonstrations.

The next meeting was started by issuing "Instructions for four hours' practice in interaction analysis according to Flanders" and "FIAK memory test". The latter tests the ability to associate from category heading to category figure - it is of course this association which must be made when the instrument is being used in observation. Demonstrations of the FIA categories and observation practice were carried out with the aid of closed-circuit taped teaching situations.

As raw material for these programs four complete lessons in the subjects Swedish and business economics were recorded. Production was simple: Teachers at the School of Education's experimental and demonstration school were visited during their teaching, FIA observations were made, and the result discussed with the teachers. We agreed that some of the teachers' normal lessons should be held the following week in the School of Education's closed-circuit TV studio. The only instructions given were that the lessons should be planned mainly as class teaching and that the teachers should be especially attentive to the possibilities of using Flanders' categories 1 - 3.

The raw material was then edited to give six demonstration sections of between four and six minutes. With the help of split-screen technique adequate category figures were introduced in the lower right-hand corner of the picture. To begin with only the categories 5, 4 and 8 were marked, in the next section categories 4, 8, 9 and 3, and so on until, finally, a whole section had been completely coded.

In order to provide a demonstration of category 1, which is uncommon, several short bits of various lessons were spliced together to make a six-minute section.

Criticism and defence of the authority of the teacher did not occur in the lessons taped, but were taken from the film "The Teacher and the Class" (Swedish Board of Education, 1965), which contains a section of a lesson with a very authoritarian teacher.

The program "Demonstrations" was studied in groups of 4 - 5 student teachers. They were urged to stop the recorder after each section, discuss the codings presented, and if necessary consult a stencil containing coding ground rules and examples.

In an earlier experiment by Brusling (1972) it was shown that video-taped demonstrations can change the teaching of student teachers. White (1972) showed in an investigation that student teachers can be changed in the direction of more responsive teaching with the aid of only sound tape demonstrations. In an experiment by Murray & Fitzgerald (1971), video-taped demonstrations were seen to be more effective than just verbal when used with the same aim. We thus have cause to expect that the program "Demonstrations" will be followed by actual behavior changes.

2.3 Practice.

From the same video-taped raw material used in the production of the demonstration program were formed ten one-minute sections which were practice coded by all in the group with the help of an observation form (Appendix B). Each section was followed by our coding suggestions, against which the members of the group could set their own for comparisons and discussion. When necessary the section was replayed until there was agreement on how the coding could reasonably be done.

2.4 Evaluation.

A 14-minute-long section of a lesson was coded by every member of the group. The observation forms were then processed for degree of agreement between observers and between each observer and our own coding of the section. A program for computer calculation of Scott's coefficient of agreement between observers (Gregory, 1969) was used. Appendix C gives a manual calculation method with examples.

2.5 Own practice lesson.

During the student teachers' first practice period, twenty minutes of a lesson was recorded with the help of the technical equipment described in Appendix D. The student teachers were asked to plan at least 20 minutes of class teaching with interaction teacher - students.

2.6 Self-observations.

Three weeks after the above recordings and in conjunction with the scheduled FIA demonstrations and practice, the student teachers had an opportunity to make closed-circuit TV observations of themselves. The tape was observed twice, the first time with the freedom to watch and listen to what could be of interest and the second time with the task of coding the twenty minutes according to Flanders' interaction analysis.

2.7 Processing of self-observations.

The observation forms handed into us were immediately subjected to computer processing, via a terminal situated in the institution, according to our own program (Appendix E). Examples of the processing results are presented in Fig. 2.

The program produces a ten-by-ten matrix on which one marking corresponds to a transition from one category to another in the sequence observed. Assume that the first observation made was that the teacher gave a directive (category 6), which was followed by the teacher asking a question (category 4). The transition from 6 to 4 constitutes <u>one</u> transition, which is placed in the sixth row and the fourth column of the matrix. The next transition to be entered

Figure 2.

COMPUTER PROGRAM FOR
FLANDERS 10-CATEGORY INTERACTION ANALYSIS SYSTEM
DEVELOPED FOR
SCHOOL OF TEACHER EDUCATION
GOTHENBURG, SWEDEN. 1972.
REVISED MARCH 1973.

TITLE: SVEN JOHANSSON, PRAKTIKPERIOD 2.

TITLE AND MILLAGE-MATRIX TO OUTPUT TAPE UNIT: 6

FREQUENCY MATRIX
-+++++++++++++++

*	1	2	3	4	5	6	7	8	9	10	TOTAL	%
1*	0	0	0	0	2	0	0	0	0	0	2	0.40
2*	0	6	2	7	7	1	0	0	2	2	27	5.37
3*	0	0	7	2	5	0	0	7	10	3	34	6.76
4*	0	1	0	13	3	2	0	15	12	8	54	10.74
5*	2	0	1	15	99	3	0	2	9	10	141	28.03
6*	0	0	0	3	3	8	0	0	1	0	15	2.98
7*	0	0	0	0	0	0	0	0	0	0	0	0.0
8*	0	10	9	5	4	0	0	22	2	1	53	10.54
9*	0	8	14	4	10	1	0	0	102	5	144	28.63
10*	0	2	1	5	8	0	0	7	6	3	32	6.36
TOT*	2	27	34	54	141	15	0	53	144	32	503	100.00

OBSERVATION TIME= 25 MIN. 24 SEC.
EXPECTED NUMBER OF TALLIES: 508.
NUMBER OF OBSERVATIONS: 503

**** THIS IS THE OBSERVED SEQUENCE:

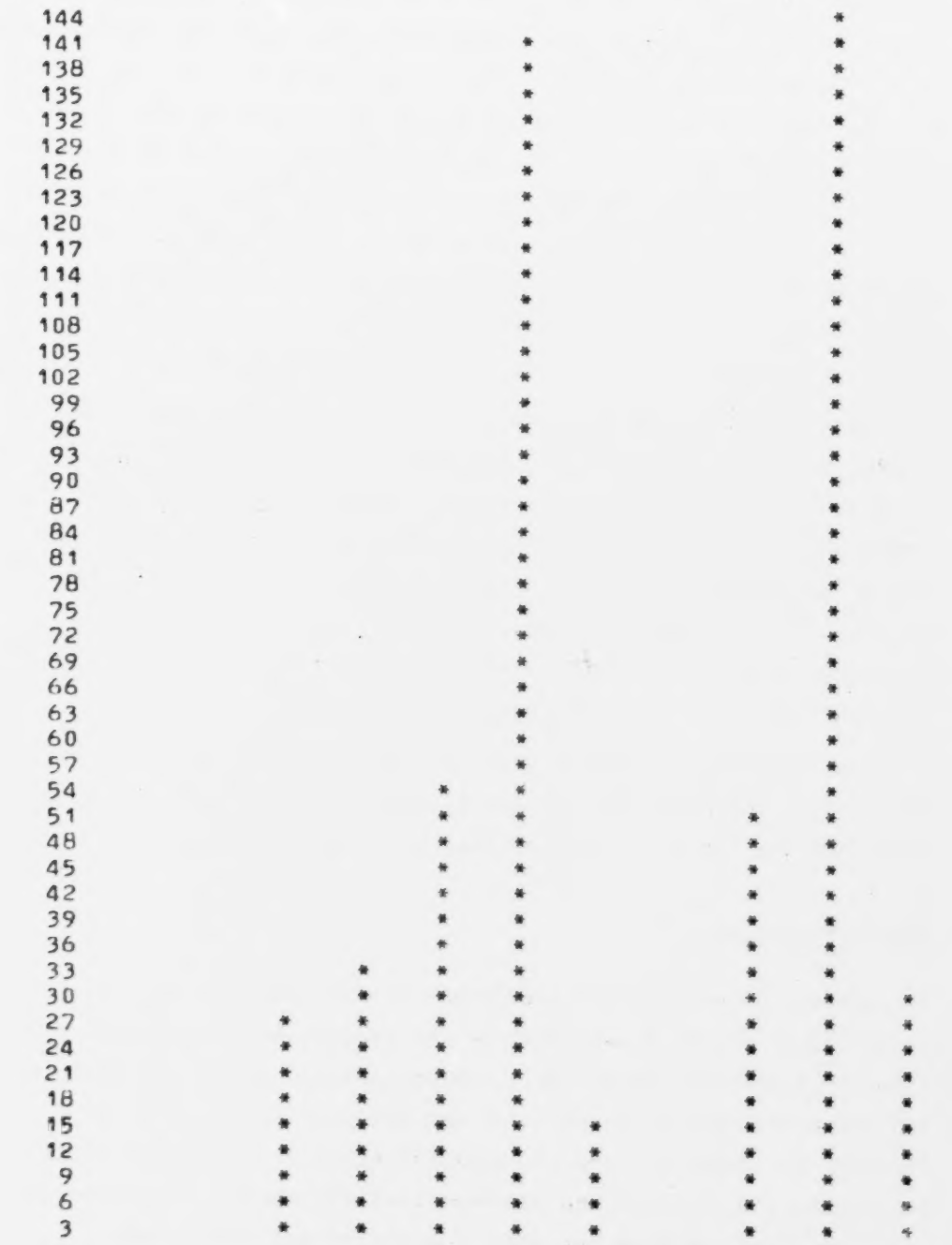
0558882555 5408254825 5499249949 5555555555 5404992330
9394499999 9055555555 5555485083 3355555555 1555555055
5554082482 4825515550 5055556666 6554004882 3088882244
5482454082 4055554450 4999999994 9995593499 3949999999
9933496999 5550484484 4933555555 5666446444 6655664485
4848480399 9999930999 9555993959 9959955542 2448888385
5550922099 3999999995 9990999999 9999922205 4939999926
5555999990 0255533848 3990999993 5555550448 3883839993
9299955555 5593393899 9958899999 9299025540 8888888888
8599255555 5555005554 4408838383 5599999999 9999999355
550

TRR = 80.8
TQR = 27.7 TT= 54.3
PIR = 73.1 PT= 39.2
TRR89= 97.6
TQR89= 39.1
CCR = 51.7
SSR = 51.7
PSSR = 62.9

HISTOGRAM 1

FREQUENCY 2 27 34 54 141 15 0 53 144 32

EACH * EQUALS 3 POINTS,



CATEGORY NUMBER 1 2 3 4 5 6 7 8 9 0

END OF DATA

is from category 4, which is where the transition just mentioned finished. If a pupil has answered the question and this has been coded in category 8, the transition 4 - 8 is obtained, and this is entered in the fourth row and eighth column of the matrix.

If observation has taken place for twenty minutes at a speed of one marking every third second, a total of 400 observations is obtained. With the above technique for the study of category sequences, a matrix with 399 transitions is obtained (the first two observations only give one transition, of course). To facilitate checking for possible mistakes in the entering of transitions, it is advisable to add a category, for example 10, to the beginning and end of the observation sequence. By this means the row and column totals will be equal, and what is called a balanced matrix is obtained. However, the total number of transitions will then be one more than the number of observations. The addition of just category 10 is arbitrary but fitting since it least influences the subsequent analysis.

As well as the matrix description, the program also gives a graphical description of the total number of observations in the ten categories, reproduces the observation sequence fed in, and forms a number of indices describing the relations between different categories and amalgamations of categories. These are briefly defined in Appendix F, otherwise we refer to Flanders (1970), pp. 100-107. There are also presented the empirical values expected for teaching in different subjects and grades.

A transcription similar to that in figure 2 was sent by post to the student teachers, who got the processed results in their letter-boxes the day after the observations had been carried out.

2.8 The self-analysis.

Procedures recommended for interpretation and analysis of FIA data according to figure 2,were sent to the student teachers together with the transcription of their own processed results. As examples are presented here interpretation and analysis of parts of the material in figure 2. You can yourself build on the interpretation principles demonstrated and discover that the amount of information well motivates the work put into observation and processing.

Firstly it can be noted that the observers have coded the twenty-five and a half minutes at an almost perfect tempo. The number of observations expected for this time, assuming one observation every third second, is 508. This figure can be compared with the actual total number of observations, 503.

From the indices TT and PT it can be seen that the teacher has talked more than half the time, while the pupils have talked 40% of the time.

The balance between initiating and responsive teacher talk shows a clear predominance for the latter type (can be seen in the quotients TRR and TRR89).

Pupil talk is mostly initiating, only 1/4 is responsive pupil talk structured by the teacher. The index PSSR states how large a share of what the pupils have said consists of statements longer than three seconds. More than half of all pupil talk is made up of such long statements.

SSR gives an idea of the degree of variation in the lesson, a high SSR quotientsignifying that the verbal course of events quickly changes character and a low SSR quotient that long sequences remain within the same category. A high CCR quotient stands for a material-centered lesson with a teacher who talks most all the time, lectures or asks questions on the basis of his lesson syllabus. These last two indices are of most use in comparisons between two lessons, when one can speculate about the reasons for the one lesson being different from the other. On the whole such a problem-centered procedure is to be recommended in matrix analysis.

In column 3 are to be found all transitions <u>from</u> different categories and <u>to</u> category 3, which is of great importance for the balance between initiating and response. Not unexpectedly, the highest figure in the column is to be found in row 9, which means that what most commonly precedes the teacher's acceptance or clarification of a pupil answer is category 9, pupil-initiated talk. Only 7 out of a total of 33 markings in category 3 follow each other, which is apparent from the figure in the third column of the third row. This means that the teacher has quite often acknowledged the pupil's answer only by repeating key-words or the like in the pupil's answer, and

more seldom expressly used, built on or developed the consequences of what the pupil has said. In row 4 are all transitions from category 4 to other categories. As the highest figure in the row is to be found in the eighth column, we can conclude that mostly the teacher puts a short question to which a pupil replies in the expected way. The lesson could be a test of homework. Study the distribution of transitions to other categories!

If you systematize the principles of analysis demonstrated above, you can easily identify recurrent teaching patterns, that is, sequences of category symbols. Let us start in category 5, the teacher informs. The most common transition from this condition is to category 4, the teacher puts a question, the question is short and is followed by a pupil answer structured by the teacher. The answer is longer than three seconds and is usually followed by praise or encouragement from the teacher; this is usually short and leads to a new question or to the teacher presenting more information. This is the usual pattern. You can of course choose to study less common patterns that include some category you are especially interested in. There is a matrix in Appendix G which represents a lesson given by another teacher in another subject. Analyse it and compare with the lesson in figure 2!

3 PRELIMINARY FINDINGS

3.1 Experimental population.

48 graduate student teachers in special subjects in their first term of training, autumn term 1972, took part as the experimental population in an experiment whose first step involved working according to the curriculum presented in this report. More than half of them had Swedish in their degree, the other had history, civics, social science, religion, psychology, pedagogy, or business economics. There were the same number of women as men.

3.2 Results, questionnaire data.

The questionnaire used classifies on the one hand the student teachers' reactions to the introductory lesson, and on the other their reaction to the closed-circuit TV program constructed for demonstrations, practice and evaluation. Because of incomplete or unclearly filled-in forms, the numbers of values counted deviates from 48 at times, but never by more than 2.

The first fifteen questions were presented as positive statements, to which the experimental population were to react by choosing one of seven steps on a scale ranging from "very divergent opinion", step 1, through "uncertain", step 4, to "complete agreement", step 7. The question "Which method for playback and analysis of your own tape do you think is most effective with reference to your training to be a teacher?" was presented as a forced choice - a question with two alternatives, playback and analysis according to self-chosen criteria or according to given criteria (for example with the help of Flanders' interaction analysis). Despite this, three student teachers marked both alternatives, which we afterwards placed in the category "don't know". The figures on pp.20-25 give the results for each statement or question on the form. Descriptive values are presented together with the graphic distribution of answers. Calculations were carried out with the BMDP2D computer program (Biomedical Computer Programs, 1971).

3.3 Results, agreement between observers and between observers and criterion.

The program referred to for the calculation of agreement between observers (Gregory, 1969) is limited to a maximum of 20 observers when there are 10 categories. Therefore three runs were made. We assume that the median agreement would not differ appreciably from what would have been obtained if the program had allowed calculations of all combinations of observers.

The three runs of the program resulted in 387 coefficients with a median of .56.

The authors together made repeated observations of the "Evaluation" program and the final sequence of coding symbols was compared with each of the sequences of the 48 memebers of the experimental population. The median of the resulting 48 coefficients was .50.

3.4 Comments on the results.

From the questionnaire results shown, it can be seen that all the components of the curriculum, from the introductory lesson to the observations of their own video-tape, functioned well in the opinion of the experimental population. It is only when one gets to assessment of pupil sound in the recordings of their own lessons that a negative opinion is expressed. As can be seen from the description of the technical procedure for recording (Appendix D), we worked in these first trial recordings with a microphone mounted on the camera. In later recordings we moved the microphone to a central position in the classroom, hung it from light fittings or something similar. This resulted in better audibility of pupil sound in the opinion of the experimental population, which is, however, not shown here.

Only with a few exceptions was a desire expressed for more opportunities for self-observation.

We had perhaps expected that the last question would give a greater spread of answers. An overwhelming majority preferred playback with analysis according to given criteria, as with the help of Flanders' interaction analysis, to playback and analysis with their own criteria. The fact that the self-observations took place when only half the training term had gone by may explain this expressed need for structuring. Other results may have been obtained later on.

The coefficient .56 which describes the degree of agreement between the members of the experimental population is far from the .85 which Flanders gives as "reasonable". In reality Scott's coefficient is not particularly easy to interpret. Scott himself (1955) says that "it can be roughly interpreted as the extent to which the coding reliability exceeds chance". If one considers agreement between observers who have together worked through the "Demonstration" and "Practice" programs, who have discussed doubts together, and who have together complemented given coding principles with their own, then we shall obtain higher figures.

It is of course possible, moreover, to attain very high figures through training which is directed at the highest degree of agreement in the observation of a special taped lesson. However, such a procedure often means a loss in precision in observations of other material, which has been pointed out by Medley & Norton (1971).

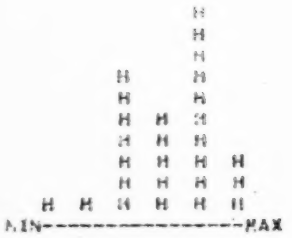
It is obvious that neither agreement between members of the experimental population nor between the population and the authors could be considered satisfactory if the observations were to be used for research purposes, for example to test the validity of some teaching theory. But for the purposes in question here, and considering the time available for training, we can be satisfied. The student teachers are made aware of types of verbal behavior which are known to be of interest when it is a question of teaching results. Interest has been aroused for the continuous renewal, development and improvement of their teaching.

QUESTIONS ON FIA TRAINING.

The pedagogy lesson devoted to Flanders' interaction analysis was a good introduction to the subsequent practical training.

NUMBER OF DISTINCT VALUES .	6
NUMBER OF VALUES COUNTED. .	46
NUMBER OF VALUES NOT COUNTED	2

MAXIMUM	7.0000000
MINIMUM	2.0000000
RANGE	5.0000000
MEDIAN	5.0000000
MODE	6.0000000
MEAN	5.1086950
ST.DEV.	1.2863073
S.E.M.	0.1896557



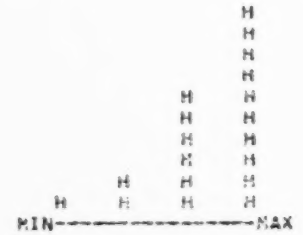
2

EACH **H** REPRESENTS 1.70 COUNTS

The stencil "Work instructions" was well designed for its purpose.

NUMBER OF DISTINCT VALUES .	4
NUMBER OF VALUES COUNTED. .	48
NUMBER OF VALUES NOT COUNTED	0

MAXIMUM	7.0000000
MINIMUM	4.0000000
RANGE	3.0000000
MEDIAN	7.0000000
MODE	7.0000000
MEAN	6.3125000
ST.DEV.	0.8789303
S.E.M.	0.1268699

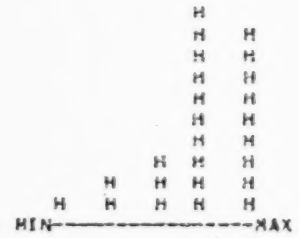


EACH **H** REPRESENTS 2.50 COUNTS

The stencil "Notes on the FIA categories with examples, Basic principles for observation and coding," was well designed to demonstrate differences between the categories and to present basic principles for coding.

NUMBER OF DISTINCT VALUES .	5
NUMBER OF VALUES COUNTED. .	47
NUMBER OF VALUES NOT COUNTED	1

MAXIMUM	7.0000000
MINIMUM	3.0000000
RANGE	4.0000000
MEDIAN	6.0000000
MODE	6.0000000
MEAN	6.0638294
ST.DEV.	0.9869638
S.E.M.	0.1439635



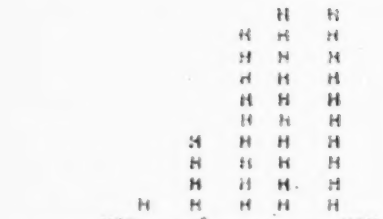
3

EACH **H** REPRESENTS 1.90 COUNTS

The "Demonstration" tape (with coding categories added in the lower right-hand corner of the picture) was well designed for demonstrating the different categories.

NUMBER OF DISTINCT VALUES .	5
NUMBER OF VALUES COUNTED. .	48
NUMBER OF VALUES NOT COUNTED	0

MAXIMUM	7.0000000
MINIMUM	3.0000000
RANGE	4.0000000
MEDIAN	6.0000000
MODE	6.0000000*
MEAN	5.6875000
ST.DEV.	1.1328039
S.E.M.	0.1635062



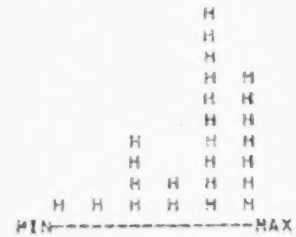
EACH "H" REPRESENTS 1.40 COUNTS

* FIRST OF MORE THAN ONE MODE

The "Practice" tape (with one-minute sections to be coded) was well designed for me to be able to make correct codings as quickly as possible.

NUMBER OF DISTINCT VALUES .	6
NUMBER OF VALUES COUNTED. .	48
NUMBER OF VALUES NOT COUNTED	0

MAXIMUM	7.0000000
MINIMUM	2.0000000
RANGE	5.0000000
MEDIAN	6.0000000
MODE	6.0000000
MEAN	5.6666660
ST.DEV.	1.2937374
S.E.M.	0.1867349

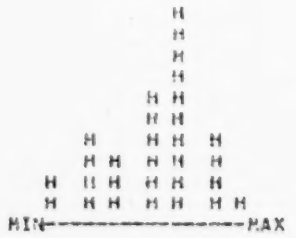


EACH "H" REPRESENTS 1.90 COUNTS

I experienced the coding of the "Evaluation" tape (the 13-minute tape that I coded as it ran) as being very easy.

NUMBER OF DISTINCT VALUES .	7
NUMBER OF VALUES COUNTED. .	47
NUMBER OF VALUES NOT COUNTED	1

MAXIMUM	7.0000000
MINIMUM	1.0000000
RANGE	6.0000000
MEDIAN	5.0000000
MODE	5.0000000
MEAN	4.2340422
ST.DEV.	1.5771847
S.E.M.	0.2300560

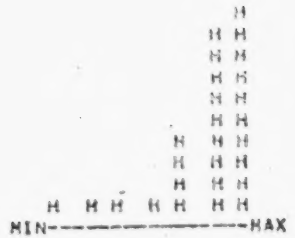


EACH "H" REPRESENTS 1.40 COUNTS

I felt the technical quality of the "Demonstration" and "Practice" tapes to be satisfactory.

NUMBER OF DISTINCT VALUES .	7
NUMBER OF VALUES COUNTED. .	48
NUMBER OF VALUES NOT COUNTED	0

MAXIMUM	7.0000000
MINIMUM	1.0000000
RANGE	6.0000000
MEDIAN	6.0000000
MODE	7.0000000
MEAN	5.7916660
ST.DEV.	1.5011806
S.E.M.	0.2166767



EACH "M" REPRESENTS 1.00 COUNTS

QUESTIONS TELATING TO YOUR EXPERIENCE OF YOUR OWN TAPE FROM P1.

Picture quality was satisfactory.

NUMBER OF DISTINCT VALUES .	7
NUMBER OF VALUES COUNTED. .	47
NUMBER OF VALUES NOT COUNTED	1

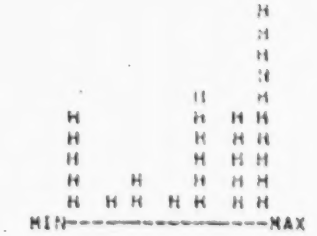
MAXIMUM	7.0000000
MINIMUM	1.0000000
RANGE	6.0000000
MEDIAN	5.0000000
MODE	7.0000000
MEAN	4.9319147
ST.DEV.	2.1146593
S.E.M.	0.3084548

EACH "M" REPRESENTS 1.30 COUNTS

Teacher sound quality was satisfactory.

NUMBER OF DISTINCT VALUES .	7
NUMBER OF VALUES COUNTED. .	46
NUMBER OF VALUES NOT COUNTED	2

MAXIMUM	7.0000000
MINIMUM	1.0000000
RANGE	6.0000000
MEDIAN	5.0000000
MODE	7.0000000
MEAN	4.9130430
ST.DEV.	2.1687279
S.E.M.	0.3197615

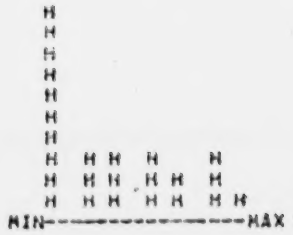


EACH "M" REPRESENTS 1.50 COUNTS

Pupil sound quality was satisfactory.

NUMBER OF DISTINCT VALUES .	7
NUMBER OF VALUES COUNTED. .	46
NUMBER OF VALUES NOT COUNTED	2

MAXIMUM	7.0000000
MINIMUM	1.0000000
RANGE	6.0000000
MEDIAN	2.0000000
MODE	1.0000000
MEAN	2.9565210
ST.DEV.	2.0216217
S.E.M.	0.2980719

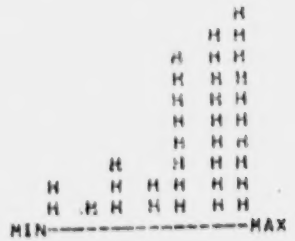


EACH "H" REPRESENTS 1.80 COUNTS

The recordings was satisfactory from the viewpoint of technical aspects of production (choice of picture, camera angle etc.).

NUMBER OF DISTINCT VALUES .	7
NUMBER OF VALUES COUNTED. .	46
NUMBER OF VALUES NOT COUNTED	2

MAXIMUM	7.0000000
MINIMUM	1.0000000
RANGE	6.0000000
MEDIAN	6.0000000
MODE	7.0000000
MEAN	5.2826000
ST.DEV.	1.7341404
S.E.M.	0.2556850

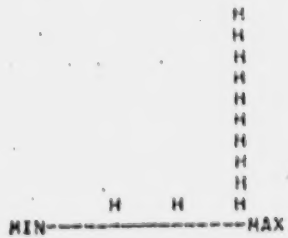


EACH "H" REPRESENTS 1.30 COUNTS

I thought it was a valuable experience to be able to see and hear myself teaching.

NUMBER OF DISTINCT VALUES .	4
NUMBER OF VALUES COUNTED. .	47
NUMBER OF VALUES NOT COUNTED	1

MAXIMUM	7.0000000
MINIMUM	4.0000000
RANGE	3.0000000
MEDIAN	7.0000000
MODE	7.0000000
MEAN	6.7021275
ST.DEV.	0.7197489
S.E.M.	0.1049861

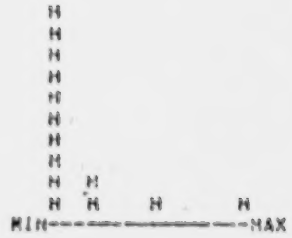


EACH "H" REPRESENTS 3.90 COUNTS

I thought it was embarassing and unpleasant to see and hear myself teaching.

NUMBER OF DISTINCT VALUES .	7
NUMBER OF VALUES COUNTED. .	46
NUMBER OF VALUES NOT COUNTED	2

MAXIMUM	7.0000000
MINIMUM	1.0000000
RANGE	6.0000000
MEDIAN	1.0000000
MODE	1.0000000
MEAN	1.8913040
ST.DEV.	1.7667074
S.E.M.	0.2604868



EACH "H" REPRESENTS 3.20 COUNTS

I would very much like to have futher opportunities to analyse myself in this way when I teach.

NUMBER OF DISTINCT VALUES .	6
NUMBER OF VALUES COUNTED. .	47
NUMBER OF VALUES NOT COUNTED	1

MAXIMUM	7.0000000
MINIMUM	1.0000000
RANGE	6.0000000
MEDIAN	7.0000000
MODE	7.0000000
MEAN	6.0638294
ST.DEV.	1.6733751
S.E.M.	0.2440868

EACH "H" REPRESENTS 3.00 COUNTS

The recording made it clear to me that my my teaching can be improved in many respects.

NUMBER OF DISTINCT VALUES .	5
NUMBER OF VALUES COUNTED. .	47
NUMBER OF VALUES NOT COUNTED	1

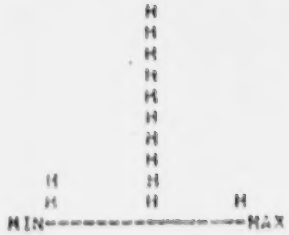
MAXIMUM	7.0000000
MINIMUM	2.0000000
RANGE	5.0000000
MEDIAN	7.0000000
MODE	7.0000000
MEAN	6.1489353
ST.DEV.	1.3669815
S.E.M.	0.1993947

EACH "H" REPRESENTS 3.10 COUNTS

Which method for playing and analysis of your own tape do you think is most effective with regard to your training to be a teacher.

NUMBER OF DISTINCT VALUES .	3
NUMBER OF VALUES COUNTED. .	47
NUMBER OF VALUES NOT COUNTED	1

MAXIMUM	3.0000000
MINIMUM	1.0000000
RANGE	2.0000000
MEDIAN	2.0000000
MODE	2.0000000
MEAN	1.9574461
ST.DEV.	0.5089393
S.E.M.	0.0742364



1. Playing and analysis according to self-chosen criteria.
2. Playing and analysis according to given criteria (for example with the help of Flanders' interaction analysis).
3. Don't know.

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APPENDICES

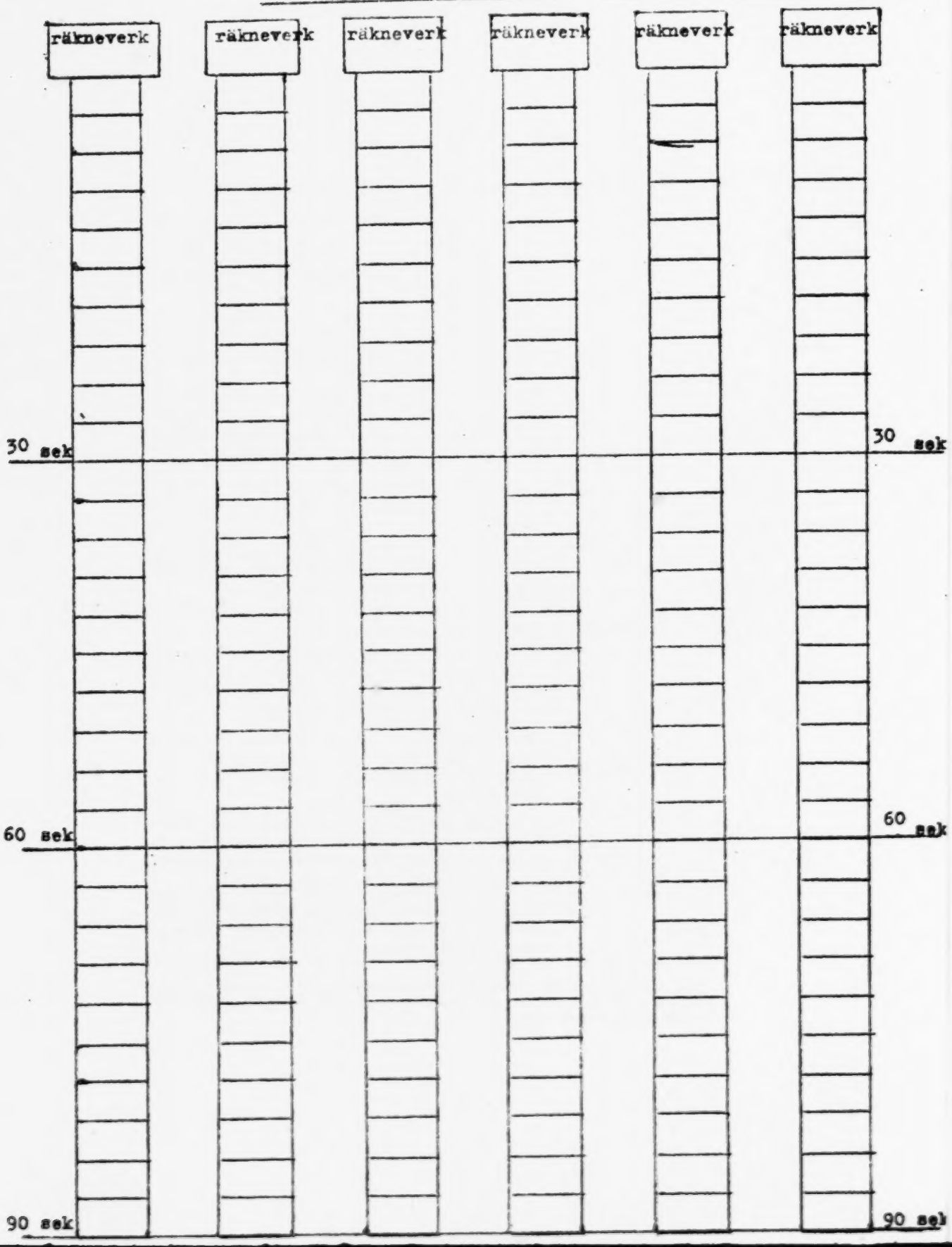
Flanders' Interaction Analysis Categories* (FIAC)

Teacher Talk	Response	1. *Accepts feeling.* Accepts and clarifies an attitude or the feeling tone of a pupil in a nonthreatening manner. Feelings may be positive or negative. Predicting and recalling feelings are included.
		2. *Praises or encourages.* Praises or encourages pupil action or behavior. Jokes that release tension, but not at the expense of another individual; nodding head, or saying "Um hm?" or "go on" are included.
		3. *Accepts or uses ideas of pupils.* Clarifying, building, or developing ideas suggested by a pupil. Teacher extensions of pupil ideas are included but as the teacher brings more of his own ideas into play, shift to category five.
		4. *Asks questions.* Asking a question about content or procedure, based on teacher ideas, with the intent that a pupil will answer.
	Initiation	5. *Lecturing.* Giving facts or opinions about content or procedures; expressing *his own* ideas, giving *his own* explanation, or citing an authority other than a pupil.
		6. *Giving directions.* Directions, commands, or orders to which a pupil is expected to comply.
		7. *Criticizing or justifying authority.* Statements intended to change pupil behavior from nonacceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing; extreme self-reference.
Pupil Talk	Response	8. *Pupil-talk—response.* Talk by pupils in response to teacher. Teacher initiates the contact or solicits pupil statement or structures the situation. Freedom to express own ideas is limited.
	Initiation	9. *Pupil talk—initiation.* Talk by pupils which they initiate. Expressing own ideas; initiating a new topic; freedom to develop opinions and a line of thought, like asking thoughtful questions; going beyond the existing structure.
Silence		10. *Silence or confusion.* Pauses, short periods of silence and periods of confusion in which communication cannot be understood by the observer.

*There is *no* scale implied by these numbers. Each number is classificatory; it designates a particular kind of communication event. To write these numbers down during observation is to enumerate, not to judge a position on a scale.

APPENDIX B

Identifikation: _____



Calculation of Scott's coefficient for interobserver agreement.

Definitions and formulas:

A and B - two independent observers of the same lesson

f - frequency

p - proportion

P_o - proportion interobserver agreement, that is $1 - |A_p - B_p|$

P_e - expected proportion of agreement by chance alone, that is $\left(\frac{A_p + B_p}{2}\right)^2$

π - Scott's coefficient, $\pi = \frac{P_o - P_e}{1 - P_e}$

Example:

Category	Frequency A_f	Frequency B_f	Proportion A_p	Proportion B_p	$\lvert A_p - B_p \rvert$	$\left(\frac{A_p + B_p}{2}\right)^2$
1	12	9	.03	.02	.01	.0006
2	3	4	.01	.01	.00	.0001
3	24	34	.07	.08	.01	.0056
4	25	25	.07	.06	.01	.0042
5	76	97	.21	.23	.02	.0484
6	3	7	.01	.02	.01	.0002
7	3	4	.01	.01	.00	.0001
8	151	160	.41	.38	.03	.1560
9	51	59	.14	.14	.00	.0196
10	19	22	.05	.05	.00	.0025
Summa	367	421	1.01	1.00	.09	.2373

$$\pi = \frac{P_o - P_e}{1 - P_e} = \frac{(1 - .09) - .24}{1 - .24} = \frac{.91 - .24}{.76} = \frac{.67}{.76} = .88$$

Technical equipment used for videotaping of lessons.

Specifications	Price	Weight	Techn.notes
Video cassette recorder Philips N 1500	3.878	17 kg	Max playing time 60 min. Hor.res. > 200 lines
Mini compact camera Philips LDH 50, AMR vidicon, XQ1030	2.000	3.5 kg	
Zoom lens Canon V5x20, 200-100 mm, 1:2.5	1.250	.5 kg	
Camera stand Slick Master de Luxe	480	3 kg	
Monitor Philips "Caddie" 12", X12T740	690	8 kg	
Microphone Philips LBB 9003/05	155		200 ohm, 10 m cable, DIN-contact
Earphones Ashidavox ST-10/8 ohm	75		
Cables	25		
Cases for transportation	1.000	16 kg	
TOTAL (excluding tax and discount)	9.553	50 kg	

Note: Prices in Swedish crowns.

Supplier: Philips Sweden Ltd., Burggrevegatan 15, Box 441, 401 26 Göteborg 1, Sweden.

Five units of the equipment specified above was bought late in 1972. Due to inability to deliver cassettes we had to start working with conventional video tape recorders, Philips LDL 1000, and 1/2" video tapes on reels.

Cost for tapes is not included in the table. We used Philips VPL5IC with a playing time of 30 minutes for 100:- each when ordering at least fifty. Tax excluded.

Personnel with no special technical knowledge were employed to run the equipment. Three hours' instruction, including some practice recording, was enough to enable them to swiftly set up and dismount the equipment in classrooms (5-10 minutes for each), and to do the necessary trimming. The operators found the equipment easy to handle. There were only a few complaints from teachers in the schools visited that the recordings were disturbing, mostly they were surprised that the operators could do their job so discreetly.

The visual quality of the recordings caused us no trouble despite working in the existing lighting, which was often poor. The camera was always mounted in a corner at the back of the classroom on the same wall as the windows. In this way disturbing light from outside was prevented from falling on the camera.

The audibility was poor throughout these recordings. The microphone was situated on a clip attached to the camera. Later we have obtained much better audibility by placing the microphone in the middle of the classroom, hanging it from a pendant lamp or the like.

Even if there is equipment less heavy than the one we have bought and used, we think that ours has a number of advantages which justify its purchase. The cassettes make it easy to handle; it is possible to make good copies of tapes produced by other machines and the VCR can be used for purposes other than those of interest here.

Program for data processing of the FIA-observations.

The programme is written in FORTRAN and is intended to fit terminal print-outs with only 80-character printing format.

This programme version is produced to serve the purposes of teacher training as well as those of research.

In order to make the job easier, especially for "terminal novices", the programme was run with a "conversational procedure". This is unique for the Computer Center of the University of Gothenburg to which our terminal is connected and thus is not presented here.

Output: A Flanders' 10-category frequency matrix, a millage-matrix, ten indices, the observed sequence and a histogram.
The program includes (optional) output to an external file.

Limitations: Ten categories, maximum 1500 tallies per lesson in the data input stream (approximately equal 1 hour 15 minutes).
Any number of lessons may be calculated in one run.

Calculations: See Flanders (1970).

Data deck set-up:

a) card 1 (options)
- col 1 Number specifying output unit. If save-tape is not wanted, write 0.
- 2 1 if millage-matrix is wanted, otherwise 0.
- 3 1 if the input sequence is to be printed, otherwise 0.
- 4 1 if frequency-matrix is wanted, otherwise 0.
- 5 1 if indices are wanted, otherwise 0.
- 6 1 if histogram is wanted, otherwise 0.
- 7-8 minutes, 9-10 seconds of observation time. If time is unknown write 00 00.

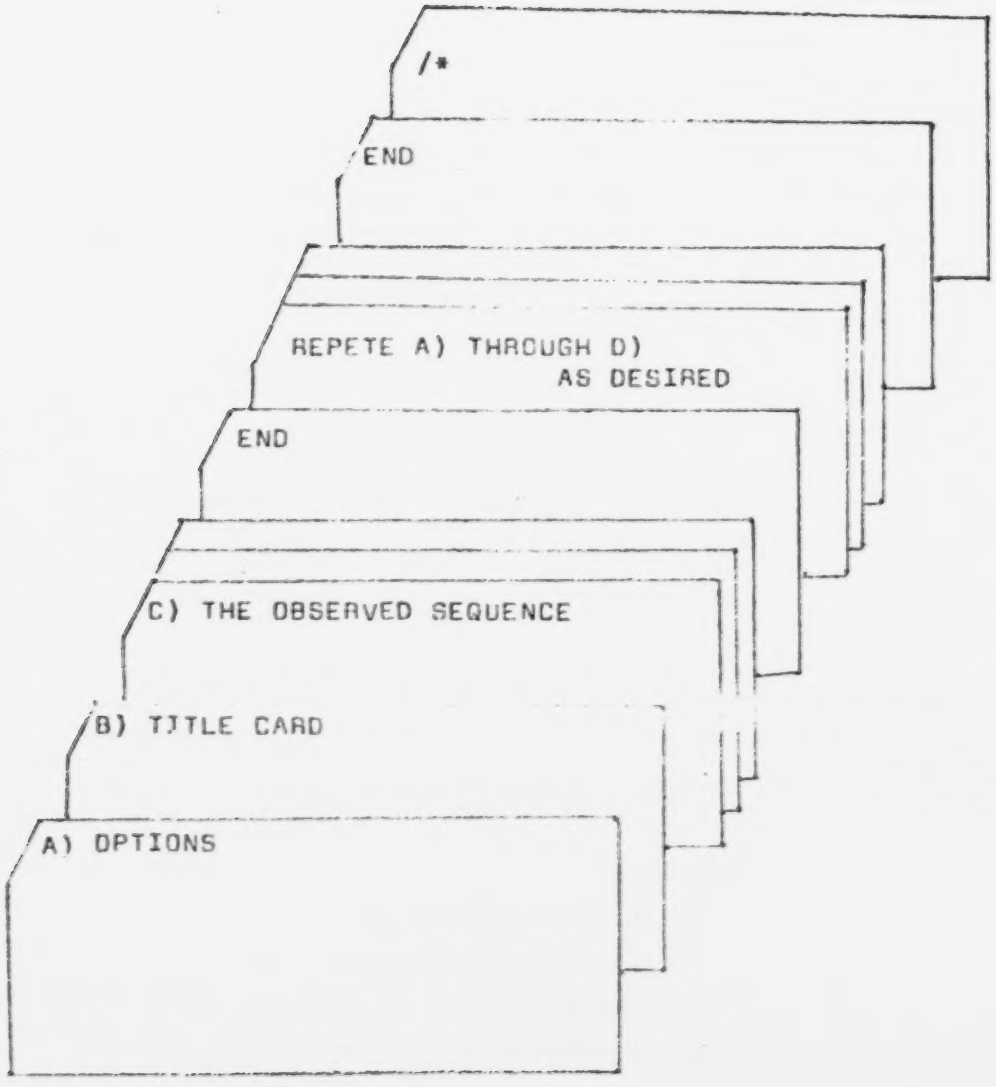
b) card 2 col 1-80 Identification title. (The card must physically be there) Same title will be printed and written on the save-tape.

c) card 3 and following:
The observed sequence (cat. 1-9 and 0 for cat.10)
The observed sequence must start in column 1 at each card and be given in a continuous sequence but can be concluded in any column.
Any number of cards can be used.

d) next card col 1-3 END

repeat a) through d) as desired.

EXAMPEL OF DECK SETUP.



```
00010 C   COMPUTER PROGRAM FOR
00020 C   FLANDERS 10-CATEGORY INTERACTION ANALYSIS SYSTEM
00030 C   DEVELOPED FOR
00040 C   SCHOOL OF TEACHER EDUCATION
00050 C   GOTHENBURG, SWEDEN.
00060 C   REVISED MARCH, 1973.
00070       DIMENSION TITL(20),FREQ(10)
00080       DIMENSION BUFF(20),PROC(11),QUOTE(10)
00090       DATA END/'END '/
00100       DIMENSION MATRIS(11,11),MM(11,11),M(100),ISLASK(1500)
00110       INTEGER IVEC(80),CVEC(80),IOPT(8)
00120       INTEGER BLANK/'    '/
00130 100   FORMAT(6I1,2I2)
00140 101   FORMAT(20A4)
00150 102   FORMAT(1H1,'TITLE:',3X,20A4//)
00160 103   FORMAT(1X,'NO OUTPUT TO EXTERNAL FILE.')
00170 104   FORMAT(1X,'TITLE AND MILLAGE-MATRIX TO OUTPUT TAPE UNIT:',I3)
00180 105   FORMAT(80I1,T1,80A1)
00190 106   FORMAT(1X,'NUMBER OF OBSERVATIONS: ',I6)
00200 107   FORMAT(1X,'OBSERVATION TIME= ',I5,' MIN.',I5,' SEC.'/1X,
00210      *'EXPECTED NUMBER OF TALLIES:',F5.0)
00220 108   FORMAT(1H0///'********  ERROR IN THE INPUT DATA  ********')
00230 109   FORMAT(20A4)
00240 1101  FORMAT(1H0,5X,'MILLAGE-MATRIX'/6X,'++++++++++++++')
00250 110   FORMAT(1H0,'CAT*    1    2    3    4    5    6    7    8    9   10')
00260 111   FORMAT(1X,'*************************************************')
00270 112   FORMAT(1X,I2,' *',10I4)
00280 113   FORMAT(1H0,'TOT*',10I4,'    N=',I4)
00290 120   FORMAT(1X,20A4)
00300 121   FORMAT(1X,25I3)
00310 122   FORMAT(1X,10I3,10I3,I5)
00320 123   FORMAT(1X,10F6.2)
00330 130   FORMAT(1H0,5X,'FREQUENCY MATRIX'/6X,'++++++++++++++++')
00340 131   FORMAT(1H0,4X,'*     1',4X,'2',4X,'3',4X,'4',4X,'5',4X,'6',
00350      *4X,'7',4X,'8',4X,'9',3X,'10',4X,'TOTAL',5X,'%')
00360 132   FORMAT(1H ,3X,'*****************************************************
00370      ******************')
00380 133   FORMAT(1H0,2X,I2,'*',2X,I3,9I5,2X,I5,F9.2)
00390 134   FORMAT(1H0,1X,'TOT*',2X,I3,9I5,2X,I5,F9.2)
00400 135   FORMAT(1H1,'COMPUTER PROGRAM FOR'/1X,
00410      *'FLANDERS 10-CATEGORY INTERACTION ANALYSIS SYSTEM')
00420 136   FORMAT(1X,'DEVELOPED FOR'/1X,'SCHOOL OF TEACHER EDUCATION')
00430 137   FORMAT(1X,'GOTHENBURG, SWEDEN. 1972.'/1X,'REVISED MARCH 1973.')
00440       NUMB=0
00450       PRINT 135
00460       PRINT 136
00470       PRINT 137
00480 1     DO 1000 I=1,11
00490       DO 1000 J=1,11
00500 1000  MATRIS(I,J)=0
```

```
00510       READ(5,100,END=999) (IOPT(I),I=1,8)
00520       READ(5,101) TITL
00530       PRINT 102,TITL
00540       IF(IOPT(1).EQ.0) GO TO 200
00550       PRINT 104,IOPT(1)
00560       GO TO 205
00570 200   PRINT 103
00580 205   J=0
00590 210   CONTINUE
00600       READ(5,109) BUFF
00610       IF(BUFF(1).EQ.END) GO TO 99
00620       CALL CORE(BUFF,80)
00630       READ(99,105)IVEC,CVEC
00640       DO 10 I=1,80
00650       IF (CVEC(I).EQ.BLANK) GO TO 5
00660       J=J+1
00670       ISLASK(J)=IVEC(I)
00680       IF(ISLASK(J).EQ.0)ISLASK(J)=10
00690 10    CONTINUE
00700       GO TO 210
00710 5     DO 7 K=I,80
00720       IF(CVEC(K).NE.BLANK) GO TO 98
00730 7     CONTINUE
00740       GO TO 210
00750 99    K=1
00760 20    IF(K.GE.J) GO TO 30
00770       I1=ISLASK(K)
00780       I2=ISLASK(K+1)
00790       MATRIS(I1,I2)=MATRIS(I1,I2)+1
00800       K=K+1
00810       GO TO 20
00820 30    CONTINUE
00830       DO 32 I=1,10
00840       SUM=0
00850       DO 31 J=1,10
00860 31    SUM=SUM+MATRIS(I,J)
00870 32    MATRIS(I,11)=SUM
00880       DO 33 I=1,10
00890 33    PROC(I)=MATRIS(I,11)*100.0/K
00900       PROC(11)=100.0
00910       DO 34 J=1,10
00920 34    MATRIS(11,J)=MATRIS(J,11)
00930       MATRIS(11,11)=K
00940       IF(IOPT(4).NE.1) GO TO 213
00950       PRINT 130
00960       PRINT 131
00970       PRINT 132
00980       DO 211 I=1,10
00990 211   PRINT 133,I,(MATRIS(I,J),J=1,11),PROC(I)
01000       PRINT 134,(MATRIS(11,J),J=1,11),PROC(11)
01010 213   CONTINUE
01020       DO 215 I=1,11
01030       DO 215 J=1,11
01040       CELL=MATRIS(I,J)*1000.0/K
01050 215   MM(I,J)=IFIX(CELL)
01060       GO TO 216
01070 98    PRINT 108
01080       STOP
01090 216   IF(IOPT(7).EQ.0) GO TO 217
01100       TID=IOPT(7)*20+IOPT(8)/3
01110       PRINT 107,IOPT(7),IOPT(8),TID
01120 217   IF(IOPT(2).EQ.1) GO TO 220
01130       PRINT 106,K
01140       GO TO 230
```

```
01150 220    PRINT 1101
01160        PRINT 110
01170        PRINT 111
01180        DO 225 I=1,10
01190 225    PRINT 112,I,(MM(I,J),J=1,10)
01200        PRINT 113,(MM(11,J),J=1,10),K
01210 230    IF(IOPT(3).NE.1) GO TO 240
01220        PRINT 2003
01230        DO 41 I=1,K
01240 41     IF(ISLASK(I).EQ.10) ISLASK(I)=0
01250        PRINT 2004,(ISLASK(I),I=1,K)
01260 2003   FORMAT(1H0,5X,' ****  THIS IS THE OBSERVED SEQUENCE:     ')
01270 2004   FORMAT(2X,10I1,1X,10I1,1X,10I1,1X,10I1,1X,10I1)
01280 240    CALL KVOT(MATRIS,K,QUOTE,IOPT(5))
01290        IF(IOPT(6).NE.1)GO TO 245
01300        NUMB=NUMB+1
01310        DO 243 I=1,10
01320 243    FREQ(I)=MATRIS(11,I)
01330        CALL HISTO(NUMB,FREQ,10)
01340 245    IF(IOPT(1).EQ.0) GO TO 260
01350        N=IOPT(1)
01360        WRITE(N,120) TITL
01370        L=1
01380        DO 250 I=1,10
01390        DO 250 J=1,10
01400        M(L)=MM(I,J)
01410 250    L=L+1
01420        I1=1
01430        I2=25
01440        DO 251 K1=1,4
01450        WRITE(N,121) (M(I),I=I1,I2)
01460        I1=I1+25
01470 251    I2=I2+25
01480        WRITE(N,122) (MM(11,J),J=1,10),(MATRIS(11,I),I=1,10),K
01490        WRITE(N,123) QUOTE
01500 260    GO TO 1
01510 999    PRINT 998
01520 998    FORMAT(1H0,'END OF DATA')
01530        STOP
01540        END
01550        SUBROUTINE KVOT(M,K,Q,IN)
01560        DIMENSION M(11,11),PROC(11)
01570        DIMENSION Q(10)
01580        DO 10 I=1,10
01590 10     PROC(I)=M(I,11)*100.0/K
01600        PROC(11)=100.0
01610        ALFA=(M(11,1)+M(11,2)+M(11,3))
01620        TRR=100.0*ALFA/(ALFA+M(11,6)+M(11,7))
01630        TQR=100.0*M(11,4)/(M(11,4)+M(11,5))
01640        PIR=100.0*M(11,9)/(M(11,8)+M(11,9))
01650        BETA=M(8,1)+M(8,2)+M(8,3)+M(9,1)+M(9,2)+M(9,3)
01660        TRRAN=100.0*BETA/(BETA+M(8,6)+M(8,7)+M(9,6)+M(9,7))
01670        DELTA=M(8,4)+M(9,4)
01680        TQRAN=100.0*DELTA/(DELTA+M(8,5)+M(9,5))
01690        CCR=100.0*((M(11,4)+M(11,5))*2-M(4,4)-M(4,5)-M(5,4)-M(5,5))/K
01700        SSR=100.0*(M(1,1)+M(2,2)+M(3,3)+M(4,4)+M(5,5)+M(6,6)+M(7,7)
01710       Q+M(8,8)+M(9,9)+M(10,10))/K
01720        TT=0.0
01730        DO 40 N=1,7
01740 40     TT=TT+PROC(N)
01750        TP=(M(8,11)+M(9,11))*100.0/K
01760        PSSR=100.0*(M(8,8)+M(9,9))/(M(11,8)+M(11,9))
```

```
01770          Q(1)=TRR
01780          Q(2)=TQR
01790          Q(3)=PIR
01800          Q(4)=TRRAN
01810          Q(5)=TQRAN
01820          Q(6)=CCR
01830          Q(7)=SSR
01840          Q(8)=PSSR
01850          Q(9)=TT
01860          Q(10)=TP
01870          IF(IN.NE.1) RETURN
01880          PRINT 2001,TRR,TQR,TT,PIR,TP,TRRAN,TQRAN,CCR,SSR,PSSR
01890 2001     FORMAT(1H0//10X,'TRR  =',F7.1/10X,'TQR  =',F7.1,10X,'TT=',F7.1/
01900         *10X,'PIR  =',F7.1,10X,'PT=',F7.1/10X,'TRR89=',F7.1/
01910         *10X,'TQR89=',F7.1/10X,'CCR  =',F7.1/10X,'SSR  =',F7.1/
01920         *10X,'PSSR =',F7.1)
01930          RETURN
01940          END
01950          SUBROUTINE HISTO(NU,FREQ,IN)
01960          DIMENSION JOUT(20),FREQ(20)
01970          INTEGER K/'*'/, NOTH/' '/
01980 1        FORMAT(6H EACH ,A1,8H EQUALS ,I2,8H POINTS,/)
01990 2        FORMAT(I6,4X,10(4X,A1))
02000 3        FORMAT(9HOCATEGORY,4X,9(I2,3X),I2)
02010 4        FORMAT(1HO,10X,11H HISTOGRAM ,I3)
02020 5        FORMAT(10HOFREQUENCY,10I5)
02030 6        FORMAT(7H NUMBER)
02040 7        FORMAT(1H ,'_____
02050         *_____')
02060          WRITE(6,4)NU
02070          DO 12 I=1,IN
02080 12       JOUT(I)=FREQ(I)
02090          WRITE(6,5)(JOUT(I),I=1,IN)
02100          WRITE(6,7)
02110          FMAX=0.0
02120          DO 20 I=1,IN
02130          IF(FREQ(I)-FMAX) 20,20,15
02140 15       FMAX=FREQ(I)
02150 20       CONTINUE
02160          JSCAL=1
02170          IF(FMAX-50.0) 40,40,30
02180 30       JSCAL=(FMAX+49.0)/50.0
02190          WRITE(6,1)K,JSCAL
02200 40       DO 50 I=1,IN
02210 50       JOUT(I)=NOTH
02220          MAX=FMAX/FLOAT(JSCAL)
02230          DO 80 I=1,MAX
02240          X=MAX-(I-1)
02250          DO 70 J=1,IN
02260          IF(FREQ(J)/FLOAT(JSCAL)-X) 70,60,60
02270 60       JOUT(J)=K
02280 70       CONTINUE
02290          IX=X*FLOAT(JSCAL)
02300 80       WRITE(6,2)IX,(JOUT(J),J=1,IN)
02310          DO 90 I=1,IN
02320 90       JOUT(I)=I
02330          WRITE(6,7)
02340          WRITE(6,3)(JOUT(J),J=1,IN)
02350          WRITE(6,6)
02360          RETURN
02370          END
```

SAMPLE INPUT

```
6011112524
SVEN JOHANSSON, PRAKTIKPERIOD 2.
05588825555408254825549924994955555555555404992330
939449999990555555555555485083335555555551555555055
555408248248255155505055556666655400488230888822244
548245408240555544504999999994999559349939499999999
99334969995550484484493355555556664464446655664 48
5484848039999999309999555993959995995554224488883 8
555509220993999999995999099999999999922205493999992
655559999900255533848399099999355555504483883839999
392999555555593393899995889999992990255408888888888
8859922555555550055544408838383559999999999999999355550
END
001111 0 0
ERIK NILSSON. PRAKTIKTERMIN 1. 1972.
055555554008888888255440889933339999999900033333
000055555555408888840888840004888888888880999999999
995555555099999555555555999997777700005555555550
END
/*
```

SAMPLE OUTPUT

Programme output (see figure 2)

The following information is given to the save tape:

```
SVEN JOHANSSON, PRAKTIKPERIOD 2.
  0  0  0  0  3  0  0  0  0  0  0 11  3 13 13  1  0  0  3  3  0  0 13  3  9
  0  0 13 19  5  0  1  0 25  5  3  0 29 23 15  3  0  1 29196  5  0  3 17 19
  0  0  0  5  5 15  0  0  1  0  0  0  0  0  0  0  0  0  0  0  0 19 17  9  7
  0  0 43  3  1  0 15 27  7 19  1  0  0202  9  0  3  1  9 15  0  0 13 11  5
  3 53 67107280 29  0105286 63  2 27 34 54141 15  0 53144 32  503
 80.77 27.69 73.10 97.62 39.13 51.69 51.69 62.94 54.27 39.17
```

First row: identification title, same as on card b) in the input stream.

Row 2 - 5: The contents of the 100 cells in the millage-matrix. (storage-mode 25I3)

Row 6: 10 row-totals in "millages", 10 row-totals in in frequencies, and the total number of observations (storage-mode 10I3, 10I3, I5).

Row 7: The indices in order TRR, TQR, PIR, TRR89, TQR89, CCR, SSR, PSSR, TT and PT (storage-mode 10F6.2).

Definitions of indices appearing in connection with FIA.

Symbol	Variable	Calculations, categories included and operations
TT	Percent teacher talk	$\frac{1+2+3+4+5+6+7}{N}$ 100
PT	Percent pupil talk	$\frac{8+9}{N}$ 100
TRR	Teacher response ratio	$\frac{1+2+3}{1+2+3+6+7}$ 100
TQR	Teacher question ratio	$\frac{4}{4+5}$ 100
TRR89	Teacher immediate response ratio	As TRR although limited to rows 8 and 9.
TQR89	Teacher immediate question ratio	As TQR although limited to rows 8 and 9.
PIR	Pupil initiation ratio	$\frac{9}{8+9}$ 100
CCR	Content emphasis (content cross ratio)	The percentage of all transitions within rows and columns 4 and 5.
SSR	Total sustained discourse (steady state ratio)	The percentage of all transitions lying in the left-right diagonal
PSSR	Pupil sustained discourse (pupil steady state ratio)	As SSR although limited to rows 8 and 9.

(From Flanders, 1970).

Lesson description according to FIA. Data computer-processed

COMPUTER PROGRAM FOR
FLANDERS 10-CATEGORY INTERACTION ANALYSIS SYSTEM
DEVELOPED FOR
SCHOOL OF TEACHER EDUCATION
GOTHENBURG, SWEDEN. 1972.
REVISED MARCH 1973.

TITLE: GUSTAV ANDERSSON 1973-03-15

NO OUTPUT TO EXTERNAL FILE.

FREQUENCY MATRIX
++++++++++++++++

*	1	2	3	4	5	6	7	8	9	10	TOTAL	%
1*	0	0	0	0	1	0	0	0	0	0	1	0.19
2*	0	0	1	3	2	0	0	2	0	0	8	1.53
3*	1	0	13	5	7	0	0	19	7	7	59	11.28
4*	0	0	3	43	4	0	0	17	1	29	97	18.55
5*	0	1	6	21	95	3	2	4	1	7	140	26.77
6*	0	1	0	3	2	5	0	2	0	1	14	2.68
7*	0	0	1	0	0	1	0	0	0	0	2	0.38
8*	0	6	22	9	11	4	0	40	5	1	98	18.74
9*	0	0	7	4	2	0	0	0	15	2	30	5.74
10*	0	0	6	9	16	1	0	14	1	26	73	13.96
TOT*	1	8	59	97	140	14	2	98	30	73	523	100.00

OBSERVATION TIME= 29 MIN. 30 SEC.
EXPECTED NUMBER OF TALLIES: 590.

MILLAGE-MATRIX
++++++++++++++

CAT*	1	2	3	4	5	6	7	8	9	10	
1 *	0	0	0	0	1	0	0	0	0	0	
2 *	0	0	1	5	3	0	0	3	0	0	
3 *	1	0	24	9	13	0	0	36	13	13	
4 *	0	0	5	82	7	0	0	32	1	55	
5 *	0	1	11	40	181	5	3	7	1	13	
6 *	0	1	0	5	3	9	0	3	0	1	
7 *	0	0	1	0	0	1	0	0	0	0	
8 *	0	11	42	12	21	2	0	76	9	1	
9 *	0	0	13	7	3	0	0	0	28	3	
10 *	0	0	11	12	30	1	0	26	1	49	
TOT*	1	15	112	185	267	26	3	187	57	139	N= 523

**** THIS IS THE OBSERVED SEQUENCE:

0555666654 0099939449 9394394335 4489085555 3335544445
5005555400 3548555555 8031555557 6555555555 5004486848
8334408884 8884444488 8855555555 5560005555 5444400008
8388385899 3355554000 0040554400 5555555550 4044083383
0664455540 0448240538 3083855438 3828893933 0038383485
4828408554 0055554450 0583040857 3555550545 5555544082
3566444400 5583883939 9440540048 8383038886 4088899999
0555939999 9555338899 9554444444 0883344000 3303040050
0883825554 0488885555 3344888848 8848488838 8855552440
5554440888 5544444055 3340054838 8888824844 4440083833
8388408686 2535555555 550

TRR = 81.0
TQR = 40.9
PIR = 23.4
TRR89= 89.7
TQR89= 50.0
CCR = 59.5
SSR = 45.3
PSSR = 43.0

TT= 61.4
PT= 24.5

HISTOGRAM 1

FREQUENCY	1	8	59	97	140	14	2	98	30	73

EACH * EQUALS 3 POINTS,

```
138                                   *
135                                   *
132                                   *
129                                   *
126                                   *
123                                   *
120                                   *
117                                   *
114                                   *
111                                   *
108                                   *
105                                   *
102                                   *
 99                                   *
 96                             *     *     *
 93                             *     *     *
 90                             *     *     *
 87                             *     *     *
 84                             *     *     *
 81                             *     *     *
 78                             *     *     *
 75                             *     *     *
 72                             *     *     *     *
 69                             *     *     *     *
 66                             *     *     *     *
 63                             *     *     *     *
 60                             *     *     *     *
 57                       *     *     *     *     *
 54                       *     *     *     *     *
 51                       *     *     *     *     *
 48                       *     *     *     *     *
 45                       *     *     *     *     *
 42                       *     *     *     *     *
 39                       *     *     *     *     *
 36                       *     *     *     *     *
 33                       *     *     *     *     *
 30                       *     *     *     *  *  *
 27                       *     *     *     *  *  *
 24                       *     *     *     *  *  *
 21                       *     *     *     *  *  *
 18                       *     *     *     *  *  *
 15                       *     *     *     *  *  *
 12                       *     *     *  *  *  *  *
  9                       *     *     *  *  *  *  *
  6                 *     *     *     *  *  *  *  *
  3                 *     *     *     *  *  *  *  *
```

CATEGORY NUMBER	1	2	3	4	5	6	7	8	9	10

END OF DATA

RAPPORTER FRÅN

PEDAGOGISKA INSTITUTIONEN VID LÄRARHÖGSKOLAN I GÖTEBORG

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